1. (Amended) A method comprising:

a) providing a reaction mixture comprising a single stranded nucleic acid template, a primer having at least 15 bases which is complementary to a portion of the single stranded nucleic acid template and a plurality of oligonucleotide 5'-monophosphates wherein each oligonucleotide 5'-monophosphate [consists of not more than] <u>has up to about</u> 10 bases and wherein each of the oligonucleotide 5'-monophosphates is labeled;

b) hybridizing the primer with the template under conditions which permit stable hybridization of the primer but not stable hybridization of the oligonucleotide 5'-monophosphates to form a primer-template hybrid having a single stranded region and a double stranded region;

c) ligating more than one of the plurality of labeled oligonucleotide 5'-monophosphates in a contiguous manner onto the primer in one continuous process under conditions which permit stable hybridization of the primer but not stable hybridization of the oligonucleotide 5'-monophosphates to extend the double stranded region and synthesize a labeled complementary nucleic acid strand, wherein ligation of oligonucleotide 5'-monophosphates only occurs in the presence of the hybridized primer.

23. (Amended) A method for synthesizing a labeled double stranded nucleic acid wherein both strands are labeled comprising:

a) providing a reaction mixture comprising a double stranded nucleic acid template, a first primer which is complementary to a region of a first strand of the template, a second primer which is complementary to a region of a second strand of the template, wherein both primers have at least 15 bases, and a plurality of labeled oligonucleotide 5'-monophosphates wherein each oligonucleotide 5'-monophosphate [consists of not more than] <u>has up to about</u> 10 bases and wherein each oligonucleotide 5'-monophosphate is labeled;

b) separating the first and second strands of the double stranded nucleic acid;

c) hybridizing the first and second primers with the separated strands under conditions which permit stable hybridization of the primer but not stable hybridization of the oligonucleotide 5'-monophosphates to form first and second primer-template hybrids;

d) ligating more than one of the plurality of labeled oligonucleotide 5'-monophosphates in a contiguous manner onto each primer-template hybrid in one continuous process under conditions which permit stable hybridization of the primer but not stable hybridization of the oligonucleotide 5'-monophosphates to extend the first and second primers thereby

producing double stranded nucleic acid, wherein ligation of oligonucleotide 5'-monophosphates only occurs in the presence of the hybridized primer; and

A2 cont'd.

e) repeating steps b-d at least once thereby synthesizing a labeled double stranded nucleic acid wherein both strands are labeled.

24. (New) A method comprising:

a) providing a reaction mixture comprising a single stranded nucleic acid template, a primer which is complementary to a portion of the single stranded nucleic acid template and a plurality of oligonucleotide 5'-monophosphates, wherein the length of each of the oligonucleotide 5'-monophosphates is relatively short in comparison to length of the primer and wherein each of the oligonucleotide 5'-monophosphates is labeled;

b) hybridizing the primer with the template under conditions which permit stable hybridization of the primer but not stable hybridization of the oligonucleotide 5'-monophosphates to form a primer-template hybrid having a single stranded region and a double stranded region;

c) ligating more than one of the plurality of labeled oligonucleotide 5'-monophosphates in a contiguous manner onto the primer in one continuous process under conditions which permit stable hybridization of the primer but not stable hybridization of the oligonucleotide 5'-monophosphates to extend the double stranded region and synthesize a labeled complementary nucleic acid strand, wherein ligation of oligonucleotide 5'-monophosphates only occurs in the presence of the hybridized primer.

25. (New) The method claim 24 wherein each of the oligonucleotide 5'-monophosphates has up to about 10 bases.

A3 cont'd.

26. (New) The method of claim 24 wherein each primer has at least 15 bases.

27. (New) A method for synthesizing a labeled double stranded nucleic acid wherein both strands are labeled comprising:

a) providing a reaction mixture comprising a double stranded nucleic acid template, a first primer which is complementary to a region of a first strand of the template, a second primer which is complementary to a region of a second strand of the template, and a plurality of labeled oligonucleotide 5'-monophosphates wherein each oligonucleotide 5'-monophosphate is relatively short in comparison to length of the primers and wherein each oligonucleotide 5'-monophosphate is labeled;

b) separating the first and second strands of the double stranded nucleic acid;

c) hybridizing the first and second primers with the separated strands under conditions which permit stable hybridization of the primer but not stable hybridization of the oligonucleotide 5'-monophosphates to form first and second primer-template hybrids;

d) ligating more than one of the plurality of labeled oligonucleotide 5'-monophosphates in a contiguous manner onto each primer-template hybrid in one continuous process under conditions which permit stable hybridization of the primer but not stable hybridization of the oligonucleotide 5'-monophosphates to extend the first and second primers thereby producing double stranded nucleic acid, wherein ligation of oligonucleotide 5'-monophosphates only occurs in the presence

A3 cont'd.

of the hybridized primer; and

e) repeating steps b-d at least once thereby synthesizing a labeled double stranded nucleic acid wherein both strands are labeled.

A3 cont'd.

28. (New) The method claim 27 wherein each of the oligonucleotide 5'-monophosphates has up to about 10 bases.

29. (New) The method of claim 27 wherein each primers has at least 15 bases.